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EVALUATION OF RECOMMENDED VIRUS TESTED YAM-*DIOSCOREA ALATA* C.V. WHITE LISBON EX BARBADOS, ON SMALL FARMS IN ST. LUCIA

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Edible yams -- *Dioscorea alata*, *D. cayenensis*, *D. rotundata*, *D. trifida*, *D. esculenta*--are the most highly-prized carbohydrate food item in the St. Lucian diet. Of these species the most widely grown is *Dioscorea alata*. Of all the rootcrops grown in the country yams command the highest prices probably reflecting the high demand for the product.

Data from the Agricultural Census in 1973-1974 indicated that nearly one hundred percent (100%) of yam production is carried out by small farmers in St. Lucia (Table 1). Total annual production is about 1,150 tonnes from five hundred and twenty acres (208 ha). Thus productivity is low on these farms as average per acre yield is only 4,400 lb (4928 kg/ha). About sixty percent (60%) of the total acreage is grown in mixed stands on steep hillsides.

White Lisbon yams grown on small farms in St. Lucia show 'virus-like' symptoms and the low level of yield may be partly due to the presence of viruses. There is scope, therefore, for the improvement of yam yields by introduction to 'clean' planting material. CARDI has developed high yielding 'virus-tested' yam planting material under its Yam Virus Project in Barbados and productivity on small farms could be improved by the utilization of such planting material. Yams contributed as much as 40% of total farm income to some farmers in certain localities in St. Lucia. It was, therefore, proposed that 'virus-tested' yams should be tested on farms in the country. The primary objective of the test was to introduce 'virus-tested' yam planting material to farms in St. Lucia as a means of increasing farm income to existing yam farmers.

MATERIAL AND METHODS

The farm characterization phase of the Small Farm Multiple Cropping Systems Research Project revealed that yams form an integral part of the farming systems identified. As a result planting material of 'virus tested' *Dioscorea alata* cv., White Lisbon ex CARDI Barbados was introduced and multiplied at the CARDI Field Station, La Ressource. The material was very clean as only about four plants out of a total population of about 4,000 showed 'virus-like' symptoms but these were rogued and burnt.

Six small farmers who participated in the detailed farm characterization surveys of the Small Farm Multiple Cropping Systems Project were selected

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Table 1: AREA AND PRODUCTION OF ARABLE CROPS BY SIZE OF HOLDING

		TOTAL	SIZE GROUP (ACRES) 0-	1-	5-	10-	25-	50-	100-	200-	500+
YAMS											
Holdings reporting	No.	6984	2446	2346	1190	726	215	44	6	10	1
Area harvested:											
Total:	Acres	516	21	154	170	126	37	5	2	1	-
Pure stands	"	205	5	66	61	49	22	2	1	-	-
Mixed stands	"	310	16	88	109	77	15	3	1	1	-
Plus:											
Total:	'000 holes	800	199	448	72	63	11	3	-	-	-
Pure stands	"	269	58	145	20	41	4	1	-	-	-
Mixed stands	"	531	140	303	52	27	7	2	-	-	-
Production Tubers:											
Total:	'000 lb	2261.8	559.0	757.6	463.8	339.9	99.2	19.4	12.0	10.9	-
Pure stands	"	1055.1	234.0	358.7	208.6	188.5	51.1	7.8	6.0	0.4	-
Mixed stands	"	1206.7	325.0	398.9	255.2	151.4	48.1	11.6	6.0	10.5	-

for the On-farm Test. There were also two 'Satelite' farmers. There were two treatments in this On-farm Test - planting material derived from farmers vs. 'virus-tested' White Lisbon yam from CARDI. On each farm the two treatments were laid down side by side and this constituted one block (replicate). Each farm, therefore, formed a replicate, of which there were eight.

All cultural operations were carried out according to the farmer's practice normal and by the farmer himself. Thus spacing, planting time, variety, type of planting material, set size, weeding, fertilizing varied according to the location and circumstances of the farmer. In some cases the yams were grown in pure stands while in others multiple cropping was practiced. On the majority of farms planting occurred between May and July, 1981 and harvesting was done nine months after planting, that is, between February and April, 1982. The edaphic and climatic characteristics of the location of these farms are given in Table 2.

The farms with these On-Farm Tests were visited on a weekly basis for observations of the plots as well as discussions with the farmers as part of a continuing characterization process.

RESULTS AND DISCUSSION

The total yields of yams derived from the farmers in this On-Farm Test are presented in Table 3. 'Virus-tested' White Lisbon yams ex CARDI Barbados gave a ninety-five percent (95%) increase in yield over farmers' yams under a wide range of climate and edaphic conditions. Cultural practices varied widely as well. Table 4 summarizes some of the major cultural practices observed on these farms. Spacings varied from 9 ft^2 (0.81 m^2) per mound to as wide as 36 ft^2 (3.24 m^2) per mound. Some farmers grew the crop in pure stands while others had varying mixed stands primarily of tannia (Xanthosoma sagittifolium), dasheen (Colocasia esculenta), cucumber (Cucumis sativus), peas (Cajanus cajan), and corn (Zea mays). On three farms NPK fertilizer was used.

There were also differences between farms in time of planting, and frequency of weeding operations.

Although 'virus-tested' yams have given an almost doubling of yield levels over existing planting material used by farmers, the latter may not merely be interested in the yield increase per se but more likely in the increase in cash they can obtain by the use of this improved material. A partial budget of the results obtained is therefore presented in Table 5. The increase in net benefit derived from the use of 'virus-tested' yam was EC$3,749.90 per acre. This is a substantial increase over the use of existing planting material. Because most small farmers in St. Lucia are usually short of capital resources, it is likely that farmers may be

Table 2. Edaphic and Climatic Characterisatics of Small Farms

Farmer ##	Location	Rainfall(inches)	Nature of Soil
226	Banse	70	Heavy Montmorillonite with clay pan
238	Banse	70	Heavy Montmorillonite with clay pan
202	Bois d'Inde	80 - 100	Brown Latosolic
214	Pelfond	80 - 100	Brown Latosolic
223	Retriate	70	Heavy Montmorillonite with clay pan
162	Glavier	70	Heavy shallow Montmorillonite
Satelite	Motete	70 - 100	Intermediate Latosolic/ Polysoil
Satelite	Roseau	70 - 100	Alluvial

Table 3.--Yield (tonnes/acre) of yam derived from On-Farm Tests

Farm #	Yield Farmer's Yam	Yield Virus Tested Yam	Gain/Loss
	(T/ha)	(T/ha)	
226	2.75	5.55	2.80
238	3.04	3.26	0.22
202	3.26	6.29	3.03
214	3.87	9.19	5.32
223	11.87	30.75	18.88
162	6.45	7.46	1.01
Satelite	10.34	20.09	9.75
Satelite	4.35	6.75	2.40
Total	45.93	89.34	43.41
Mean Yield	5.74	11.17	5.43

Table 4. Cultural Operations in Yam On-Farm Test

Farm ##	Spacing (ft)	Fertilizer Use	Cropping System
220	5.5 x 5.5	None	Tannia + Cucumber + Corn
230	5 x 4	None	Pure stand
202	3 x 6	None	Dasheen + Peas
214	3 x 3	None	Pure stand
223	3 x 3	3 oz NPK fertilizer/ mound	Tannia
152	4 x 3	4 oz NPK fertilzer/ mound	Pure stand
Satelite	4 x 3	3 oz NPK fertilzer/ mound	Pure stand
Satelite	4 x 4	3 oz NPK fertilzer/ mound	Corn + Cucumber

Table 5. Partial Budget of On-Farm Yam Production Tests

	Farmers' Yam	Virus Tested Yam
Mean Yield (tonnes/acre)	5.74	11.17
Losses due to poor handling, storage etc.	-0.57	- 1.12
Net Yield (tonnes/acre)	5.17	10.05
Gross Revenue ($1000/tonne)	5170.00	10050.00
Variable Costs		
Seed Material*	544.50	1089.00
Harvest Cost (30 m.d./acre/10,000 lb at $20 m.d.	620.40	1206.00
Total Variable Cost	1164.90	2295.00
Net Benefit ($/acre)	4005.10	7755.00

* It is assumed that the improved planting material of the 'Virus Tested' yam would cost twice as much as the farmers' planting material.

$$\text{Rate of Return} = \frac{7755.00 - 4005.10}{2295.00 - 1164.90} = \frac{3749.9}{1130.1} = 3.32$$

$$= 332\%$$

Table VI: Marginal Analysis of On Farm Yam Production Test

Marginal Cost $ = Total Variable Cost (Virus Tested) - Total Variable Cost (Farmer's Yam)

= $2295.00 - 1164.90

= $1130.10

$$\text{Marginal Cost in Yam} = \frac{\text{Marginal Cost}}{\text{Price of Yam}}$$

$$= \frac{1130.10}{1000.00}$$

= 1.13 tonnes/acre

Marginal Yield required to satisfy farmers* = 1.13 tonnes/acre x 1.50

= 1.70 tonnes/acre

*Assumes that farmers will be satisfied with a 50% rate of return on investment.

more interested in the returns they will get from the use of their scarce capital resource. The rate of return derived from the data is of the order of 332%. This is a phenomenal return and it is most likely that farmers would respond positively to the use of the 'virus-tested' yam planting material.

However, it should be indicated that because of the varying edaphic, climatic and cultural circumstances of individual farmers in the sample there were wide variations in the levels of gain achieved--Table 3. Because of this marginal analysis--Table 6--indicates that 'virus-tested' yam must yield 1.70 tonnes per acre over and above farmers' yam planting material in order to satisfy farmers. This occurred with six out of the eight farmers (75%) who participated in the test and it would therefore be reasonably safe to recommend the use of 'virus-tested' Dioscorea alata cv., White Lisbon ex CARDI, Barbados, to small farmers in St. Lucia.

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